

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قال تعالى :

آمَنَ الرَّسُولُ بِمَا أُنزِلَ إِلَيْهِ مِنْ رَبِّهِ وَالْمُؤْمِنُونَ كُلُّ آمَنَ
بِاللَّهِ وَمَلَائِكَتِهِ وَكُتُبِهِ وَرُسُلِهِ لَا نُفَرِّقُ بَيْنَ أَحَدٍ مِّنْ رُّسُلِهِ
وَقَالُوا سَمِعْنَا وَأَطَعْنَا غُفْرَانَكَ رَبَّنَا وَإِلَيْكَ الْمَصِيرُ (285)
لَا يُكَلِّفُ اللَّهُ نَفْسًا إِلَّا وُسْعَهَا لَهَا مَا كَسَبَتْ وَعَلَيْهَا مَا
اَكْتَسَبَتْ رَبَّنَا لَا تُؤَاخِذْنَا إِن نَّسِينَا أَوْ أَخْطَأْنَا رَبَّنَا وَلَا تَحْمِلْ
عَلَيْنَا إِصْرًا كَمَا حَمَلْتَهُ عَلَى الَّذِينَ مِنْ قَبْلِنَا رَبَّنَا وَلَا
تَحْمِلْنَا مَا لَا طَاقَةَ لَنَا بِهِ وَاعْفُ عَنَّا وَارْحَمْنَا
أَنْتَ مَوْلَانَا فَانصُرْنَا عَلَى الْقَوْمِ الْكَافِرِينَ (286)

صدق الله العظيم

سورة البقرة آيات 285-286

Dedication

To the reasons of my confidence and source of power to
moving

my parents ,

sisters

my wife and my little daughter
„ Minna „

Acknowledgment

Firstly I would like to thank God for giving me the ability to complete this study,

I would like to express my sincere thanks to my supervisor Dr. Humodi Ahmed Saeed for his guidance and invaluable advice throughout this study.

My thanks to the staff of the Research Laboratory, Sudan University of Science and Technology, for technical assistance.

My gratitude goes to Abdu Elraheem Mohamed Ali, leader of the electronic library of the Red Sea University, for his patience and support.

Finally, I would like to thank my parents, sisters, wife and my best friends Makram Khalil and Mohamed Aman for their patience and support throughout the year.

Abstract

This study was carried out in Khartoum state during the period from November 2008 to March 2009, to investigate antimicrobial resistance of *Proteus mirabilis* isolated from patients suffering from community - acquired urinary tract infections. Two hundred and nineteen urine specimens were collected from patients attending Khartoum Teaching Hospital, Fudail Center, Gaffer Iben Auff specialized Hospital for Children and Khartoum North Teaching Hospital.

The specimens were cultured on blood and MacConkey's agars for primary isolation of the pathogen. Identification of the isolates was done by colonial morphology, gram stain and biochemical tests using API 20E.

Modified Kirby-Bauer disc diffusion method was adopted to determine the resistance rate of *P. mirabilis* to nitrofurantoin, amoxicillin, nalidixic acid, co-trimoxazole, amoxycylav, ticarcillin, ciprofloxacin and ceftriaxone. Minimum inhibitory concentrations (MICs) of ceftriaxone, amoxycylav, co-trimoxazole, ciprofloxacin and chloramphenicol were determined by E. test.

Out of the two hundred and nineteen urine specimens examined, only 10 (4.6 %) *P. mirabilis* were recovered.

The result revealed that the antimicrobial resistance of *P. mirabilis* was as follows: amoxicillin and nitrofurantoin (100% each), co-trimoxazole (40 %), nalidixic acid, Ciprofloxacin and Ceftriaxone (20.% each), and no resistant was observed to amikacin, ticarcillin and amoxycylav.

The result indicated that the MIC, MIC₅₀ and MIC₉₀ of amoxycylav were (4 µg/ml, each), co-trimoxazole (0.5 - 4 µg/ml, 0.5µg/ml and 4 µg/ml), ceftriaxone (0.008- 0.08µg/ml, 0.008µg/ml and 0.08 µg/ml) and ciprofloxacin (0.001- 0.01µg/ml, 0.001µg/ml and 0.0 µg/ml).

The study concluded that the responsibility of *P. mirabilis* to UTIs slightly higher than previously recorded. The antimicrobial resistance of *P. mirabilis* to traditionally used antibiotics was also high.

المستخلص

၁. ဂုဏ်ထူးဆောင်များအား ဂုဏ်ထူးဆောင်ဘွဲ့ကို ၂၀၀၉ ခုနှစ် ဇူလိုင်လ ၂၀ ရက်နေ့တွင် ဂုဏ်ထူးဆောင်ဘွဲ့အဖြစ် ချီးမြှင့်ပေးခဲ့ပါသည်။

[illegible][illegible][illegible][illegible]

১৯৭১ সালে বাংলাদেশের স্বাধীনতা লাভের পরে দেশের মানুষের মনোবৃত্তি ছিল দেশের উন্নয়ন ও জনশ্রুতির প্রতিবেদন। এই সময়ের সাংবাদিকরা দেশের উন্নয়ন ও জনশ্রুতির প্রতিবেদন দিচ্ছিলেন।

Table of Contents

الأية	I
Dedication	II
Acknowledgment	III
Abstract	IV
Abstract (Arabic)	V
Table of Contents	VI
List of tables	IX
List of color plates	X
Chapter One: Introduction and objectives	1
1.1 Introduction	1
1.2. Rationale	3
1.3. Research questions	3
1.4. Objectives	4
1.4.1. General objective	4
1.4.2. Specific objectives	4
Chapter Two: Literature Review	5
2.1. The genus <i>Proteus</i>	5
2.1.1. History	5
2.1.2. Classification	5
2.2. <i>Proteus mirabilis</i>	6
2.2.1. Definition	6
2.2.2 Habitat	6
2.2.3. Antigenic structures	6
2.2.4. Epidemiology	6
2.2.5. Pathogenicity and Pathogenesis	7
2.2.5.1 Urinary tract infection	8
2.2.5.1.1 Symptoms of urinary tract infection	8
2.2.6. Defence system against bacteria	9
2.2.7. Diagnosis	10
2.2.8. Treatment	11
2.2.9. Prevention	11

3. Chapter Three: Materials and Methods	13
3.1. Study design	12
3.1.1. Type of study	12
3.1.2. Study area	12
3.1.3. Target population	12
3.1.4. Data collection	12
3.2. Collection of specimens	12
3.3. Cultivation of specimens	13
3.3.1. Culture media	13
3.3.2. Inoculation of urine specimens	14
3.4. Examination of bacterial growth	14
3.4.1. Interpretation of culture growth	14
3.5. Purification of bacterial growth	14
3.6. Identification of <i>P. mirabilis</i>	14
3.6.1. Primary identification	14
3.6.1.1. Colonial morphology	14
3.6.1.2. Gram's stain	14
3.6.2. Confirmatory identification	15
3.6.2.1. Oxidase test	15
3.6.2.2. API 20 E	15
3.6.2.2.1. Procedure	15
3.6.2.2.2. Interpretation	16
3.7. Antimicrobial susceptibility test	16
3.7.1. Preparation of Mueller Hinton Agar	16
3.7.2. Preparation of Macfarland standard	17
3.7.3. Preparation of inoculum	17
3.7.4. seeding of the discs	17
3.7.2. Interpretation of the zone size	17
3.7.3. Minimum inhibitory concentration	18
3.7.3.1 Procedure	18
3.7.3.2 Interpretation of the trst result	18
4. Chapter Four: Results	20

4.1. Criteria of isolation of <i>P. mirabilis</i>	20
4.2. Identification of <i>P. mirabilis</i>	20
4.2.1 Colonial morphology	20
4.2.2. Conventional method	20
4.2.4. API 20 E	20
4.2.4 Antimicrobial sensitivity test	20
5. Chapter Five: Discussion	26
5. Discussion	26
6. Chapter Six: Conclusion and Recommendation	29
5.1. Conclusion	29
5.2. Recommendations	29
References	30
Appendixes	35

List of Tables

Table 1. Distribution of specimens according to patients gender	21
Table 2. Distribution of specimens according to patients age group	21
Table 3. Significant and insignificant growth on MacConkey`s agars	21
Table 4. Prevalence of <i>P. mirabilis</i> according to patients gender	21
Table 5. Biochemical tests on API 20 E	22
Table 6. <i>P. mirabilis</i> susceptibility to antimicrobial agents	23
Table 7. Rate of antibiotic resistance <i>P. mirabilis</i>	23
Table 8. Minimum inhibitory concentration of antimicrobial agents	24
Table 9. Mean MIC value of antimicrobial agents to <i>P. mirabilis</i>	24

List of coloured plates

1. MIC test of co-trimoxazole and amoxiclav against *P. mirabilis* by E. test 24
2. Biochemical reaction of *P. mirabilis* using API 20E test24